PB86-127107

Second EPA (Environmental Protection Agency) Evaluation of the POLARION-X Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act

(U.S.) Environmental Protection Agency
Ann Arbor, MI

Apr 85

U.S. Department of Commerce
National Technical Information Service
NTIS

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-AA-TEB-511-85-2		PB86 127107/AS

4. TITLE AND SUBTITLE	5. REPORT DATE
Second EPA Evaluation of the POLARION-X Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act.	April 1985
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
Edward Anthony Barth	
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
U.S. Environmental Protection Agency Office of Mobile Sources Test and Evaluation Branch Ann Arbor, MI 48105	11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
Same as box 9.	Technical
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

This document announces the conclusions of the EPA evaluation of the POLARION-X device under the provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

The second evaluation of the POLARION-X device was conducted upon receiving an application for evaluation from the marketer of the device. The device is a fuel magnet. It is claimed to reduce emissions, to improve fuel economy and performance, to provide more complete combustion, to eliminate engine carbon buildup and dieseling, and to reduce the octane requirements of the engine.

EPA fully considered all of the previous correspondence and analyses that were incorporated in the prior evaluation. In addition, the intervening correspondence about the device and test fuel are also considered to apply to the application. The net result is that, except for the test data, the previous submission and the analyses of it are essentially unchanged.

Based on engineering judgement, and the results of test data it is concluded that the POLARION-X device will not improve emissions or fuel economy.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Automobiles Exhaust Emissions Fuel Consumption Tests	Fuel Economy Gas Saving Devices	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release Unlimited	Unclassified	38
	20. SECURITY CLASS *(This page)*	22. PRICE
	Unclassified	

EPA Form 2220-1 (9-73)

PB86-127107

EPA-AA-TEB-511-85-2

Second EPA Evaluation of the POLARION-X Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act

by

Edward Anthony Barth

April, 1985

Test and Evaluation Branch
Emission Control Technology Division
Office of Mobile Sources
U.S. Environmental Protection Agency

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

EPA Evaluation of the POLARION-X Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act

The Motor Vehicle Information and Cost Savings Act requires that EPA evaluate fuel economy retrofit devices and publish a summary of each evaluation in the Federal Register.

EPA evaluations are originated upon the application of any manufacturer of a retrofit device, upon the request of the Federal Trade Commission, or upon the motion of the EPA Administrator. These studies are designed to determine whether the retrofit device increases fuel economy and to determine whether the representations made with respect to the device are accurate. The results of such studies are set forth in a series of reports, of which this is one.

This second evaluation of the POLARION-X device was conducted upon receiving an application for evaluation from the marketer of the device. The device is a fuel line magnet. It is claimed to reduce emissions, to improve fuel economy and performance, to provide more complete combustion, to eliminate engine carbon buildup and dieseling, and to reduce the octane requirements of the engine.

This application was essentially a copy of the previous application with subsequent vehicle test data from private labs included. Although these data did not show a clear or consistent pattern for the device, they were sufficient to justify EPA conducting a second evaluation if the applicant was willing to fund the EPA confirmatory testing, the next step in the evaluation process. The applicant provided the funds. EPA tested the device and proceeded with the evaluation.

Since this application was a copy of the previously completed application. EPA considers that the previous correspondence and analyses that were incorporated in the prior evaluation also apply to this evaluation. In addition, the intervening correspondence about the device and test fuel are also considered to apply to the application. The net result is that, except for the test data, the previous submission and the analyses of it are essentially unchanged.

The following is the information on the device as supplied by the Applicant and the resulting EPA analysis and conclusions. For Sections 1 through 6d(1) these are the same as in the prior evaluation. For brevity, this prior information is given below

without the numerous applicable attachments (these attachments are listed in the appendix and are available as part of the previous evaluation report).*

1. Title:

Application for Evaluation of POLARION-X under Section 511 of the Motor Vehicle Information and Cost Savings Act.

The information contained in sections two through five was supplied by the applicant.

2. Identification Information:

a. Marketing Identification of the Product:

POLARION-X Fuel Treatment Part No. 11587

b. Inventor and Patent Protection:

(1) Inventor

Albert J. Kovacs
1929 H
South Pasadena, CA 91030

(2) Patent #4,372,852 issued 2/8/83

Patent Application Serial No. 207,644 relating to "MAGNETIC DEVICE FOR TREATING HYDROCARBON FUEL" was replaced by the patent.

c. Applicant:

(1) AZ Industries, Inc.
28065 Diaz Road
Temecula, CA 92390

(2) Principals

LaVern (Les) L. Adam, President
31315 Via Norte
Rancho, CA 92390

Lawrence E. Beard, Vice President
2855 Monte Verde
Covina, CA 91724

---

* The previous evaluation was "EPA Evaluation of the POLARION-X Device Under Section 511 of the Motor Vehicle Information and Cost Savings Act," EPA-AA-TEB-511-82-9.

Barbara Adam
3135 Via Worte
Raneho, CA 92390

Robert L. Arnold, Treasurer
935 Roanoke Road
San Marino, CA 91108

Albert J. Kovacs, Consultant
1929 H
South Pasadena, CA 91030

(3) LaVern Adam is authorized to represent AZ Industries in communications with EPA.

d. Manufacturer of the Product:

(1) Name and address

AZ Industries, Inc.
28065 Diaz Road
Temecula, CA 92390

(2) Principals

LaVern (Les) Adam, President
Lawrence E. Beard, Vice-President
Barbara Adam, Secretary
Robert L. Arnold, Treasurer
Albert J. Kovacs, Consultant

3. Description of Product (as supplied by Applicant):

a. Purpose:

"The present device is a magnetic unit for treating hydrocarbon fuel and an improvement on previous electromagnetic devices developed with Saburo Miyata Moriya in that it requires no outside source of energy and therefore is a means to conserve energy."

b. Theory of Operation:

"It is a well established principle that an electric field will promote combustion, increase vaporization and heat transfer. Many papers have been presented by the JSME and a list of Dr. Asakawa's papers are enclosed in the letter of July 6, 1981 to Dr. John Chao, Senior Motor Vehicle Pollution Engineer of the

California Air Resources Board which explains in detail the theory of operation." This letter and its enclosures were contained in the application as an exhibit. It transmitted a number of documents to CARB. The pertinent ones have been incorporated in this evaluation as attachments.

c. Construction and Operation:

"Information is in letter of July 6, 1981 and contains data for this subsection c) under POLARION-X GAS SAVER UNIT, BLOCK DIAGRAM, installation instructions and Patent Drawing." (Attachments A, A-1, D, and E).

4. Product Installation, Operation, Safety and Maintenance (as supplied by Applicant):

a. Applicability:

"The EPA Fuel Economy Estimates, Second Edition, February 1981 California has been marked up to indicate those vehicles which the device is suitable. The device can be connected into all fuel line systems of carbureted engines and is not suitable for fuel injection, gasoline or fuel injection, diesel. Part No. 11587 is applicable to all carbureted engines." This copy of the EPA Fuel Economy Guide was marked to indicate that the device applied to all 1981 California vehicles with carbureted gasoline engines.

b. Installation - Instructions, Equipment, and Skills Required:

(1) "General instructions are contained in installation instruction brochure and provide two ways to install unit, with or without cutting existing fuel line.

(2) "Unit is a universal model fitting vehicles with carburetors only.

(3) "Tools required are a knife or scissors to cut hose or hoses to proper length, pliers and a screwdriver for unloosening existing clamps and tightening new clamps.

(4) "No equipment required to check the accuracy of the installation.

(5) "No adjustments to vehicle or vehicle systems as well as the device following installation. (California mandates no deviations from factory settings and specifications.)

(6) "Skills associated with the installation of the device would be those possessed by the average do it-yourself person who services his own car and is capable of minor repairs such as adjusting fan belts, removing and replacing air, oil and gasoline filters, etc."

c. Operation:

"The unit is furnished with installation instructions and a brief explanation of the history and principles of the magnetic fuel treatment device for use on engines equipped with carburetors."

d. Effects on Vehicle Safety:

"No effect on vehicles or occupants have been observed since the supervised testing program was initiated at California State University of Los Angeles beginning in January 1980 on 10 vehicles driven by graduate students, faculty and technicians. Independent testing laboratories; Automobile Club of Southern California; Transportation Testing, Inc. of Texas; USAC, (IMS), Speedway, Indianapolis have reported no unsafe conditions resulting from installing. Total of 33 cars have had units installed for testing purposes with no record of any unsafe condition. Additional backup data in Exhibit No. 5 supports no hazardous conditions have occurred dating back to original electromagnetic models which have been sold since early in 1962." Exhibit No. 5 was a copy of the EPA/DOE 1981 Gas Mileage Guide for California and contained no information about the device.

e. Maintenance:

"No maintenance is required on the unit except periodic inspection of hose connections."

5. Effects on Emissions and Fuel Economy (submitted by Applicant):

a. Unregulated Emissions:

"See exhibit, letters from Ed Payne, Vice President and General Manager of Transportation Testing Incorporated of Texas dated September 3, 1981 to Al

Kovacs, Azaka Co., inventor, on fleet vehicles used in their testing operations which were equipped with the fuel treatment unit. Some are vehicles used in the 50,000 mile reliability testing but not individually identified. Approximately 15 vehicles are equipped with fuel treatment units, accumulating mileage and are checked weekly on an exhaust gas analyzer."

b. Regulated Emissions and Fuel Economy:

"Test data supplied as noted - Exhibit No. 8". The new test data that was submitted for this second evaluation is presented and discussed in Section 6d(2).

The following sections are EPA's analyses and conclusions for the device

---

6. Analysis

a. Identification Information:

(1) In the first evaluation, a copy of the patent application, Attachment A, was provided by the applicant (Attachment J) in response to the EPA request (Attachment H) for additional information about the device. A copy of the patent was provided with this second application.

b. Description:

(1) The primary purpose of device as given in Section 3a did not give a clear purpose for the device. EPA twice requested (Attachments H and L) the applicant to clarify the purpose.

The purpose was finally clarified to be (Attachment N):

"The purpose of the Polarion X Gas Unit is:

1. Increase fuel economy
2. Reduce exhaust emissions
3. Eliminate carbon build up
4. Permit use of lower octane rated gasoline
5. Increase engine performance
6. Eliminate after running or dieseling"

The installation brochure (Attachment E) also states that the device promotes fuel vaporization, provides more complete combustion, and improves the combustion rate.

(2) The theory of operation given in Section 3b refers to the use of an electric field to "... promote combustion, increase vaporization, and heat transfer." The exhibits also refer to electrical devices. However, since the POLARION-X is a magnetic device, the applicability of this information was not apparent and EPA requested the applicant to clarify how his magnetic treatment of the fuel would beneficially affect emissions or fuel economy.

Despite numerous requests and responses, the applicant was unable to adequately explain the theory of operation for the POLARION-X (see Attachments H, J, L, N, O, and P). During a follow up phone call by EPA, the applicant finally stated that it was difficult to explain the theory by which the device works, that it worked by molecular theory.

Thus, the applicant did not provide a sound technical basis for EPA to believe the POLARION-X has a beneficial effect on either emissions or fuel economy. EPA is not aware of any information that demonstrates that magnetically treating the fuel will affect emissions or fuel economy. The applicant was unable to provide a technically sound theoretical explanation that adequately described the beneficial effects of the device.

(3) The description of the device as described by the documents listed in Section 3c, the block diagram (Attachment A-1), installation instructions (Attachment E), and patent drawing (Attachment A) provided an adequate description of the construction and claimed method of operation of the device.

However, because the applicant stated in Section 3a that this device was ". . . an improvement over previous electromagnetic devices developed . . .", EPA requested (Attachment H) the applicant to describe these improvements in greater detail. The applicant provided the following description of the differences:

> "The improvement is based on the increased magnetic lines of force with the placement of the magnet element. The previous ION-X and ATOM-X electromagnetic units produce approximately 450 gauss at the center of the

unit. The POLARION-X unit measures approximately 750 gauss at the magnet surface and 1500 gauss equidistant between the surfaces .060 inches apart.

Improvements of the magnetic unit over earlier electromagnetic units are (1) increased gauss readings, (2) no electrical potential required to activate the electromagnets and conserving energy from not being connected to the alternator, (3) the magnet unit cannot cause a spark which is a possibility with an electromagnet, (4) ceramic magnets are capable of operating at engine compartment temperatures." See Attachment J.

(4) According to the specific claims of the applicant for the device "Emissions - Depending on engine conditions, can be reduced in a range from 5% to 10% for CO, 2% to 10% HC. Gas mileage improvements as measured by SAE methods 5%. Increased performance measuring various engine parameters 10%." (Applicants response (Attachment J) to EPA request (Attachment H) for specific claims for the device.)

(5) According to the applicant (Attachment J), the suggested retail price of POLARION-X IS $35.00.

c. Installation, Operation, Safety and Maintenance:

(1) Applicability:

The applicability of the product as stated in the application, to essentially all carbureted gasoline powered vehicles is judged to be reasonable. That is, it is possible to install the device on these vehicles. In Attachment K, the applicant also stated that a new design was being developed for gas and diesel injection systems.

(2) Installation - Instructions, Equipment and Skills Required:

The installation brochure (Attachment E) adequately describes the installation of the device. The applicant's statements, Section 4b, about the tools, equipment, and skills required

10

for installation appear reasonable. The installation is relatively simple. In the EPA tests of the device, installation took one hour.

There are, however, several aspects of the installation that were overlooked by the applicant. Installation of the device requires additional hardware that is not provided with the device. According to the applicant (Attachment J), this "Additional hardware is not supplied due to the various engine configurations. Hoses and clamps of proper size are readily available for specific engines from auto parts shops."*

Although the application clearly stated in Section 4b(5) that no post-installation adjustments are required, the installation instructions state that "Slightly less fuel is used if the carburetor is adjusted when you have a tune up to take advantage of the magnetic effect." EPA requested (Attachment H) the applicant to explain what this adjustment entailed, how was it made, and to explain this apparent inconsistency between the installation instructions in the application and those provided with he device. In Attachment J, the applicant informed EPA that:

> "A tune-up is strongly recommended at time of installation. California prohibits any deviation from factory specifications for tune-ups. In states where adjustments are permitted a slightly leaner setting can be made. After the unit is installed and approximately 500 miles is accumulated full economy increase can be measured and emission by products are reduced."

Therefore, it appears the instructions provided with the device are slightly misleading and do not inform the purchaser how to adjust the carburetor ". . . to take advantage of the magnetic effect."

(3) Operation:

The applicant refers to the installation instructions for operating information. These instructions make no reference to the necessity

*Although the applicant didn't indicate that the hardware was now supplied, the blister-pak packages provided for the EPA testing of the device contained the necessary clamps and hoses .

for a mileage accumulation prior to obtaining a benefit. However, the "Abstract of Development of POLARION-X" states "Most engines would require

preconditioning periods of up to 1000 miles before optimum fuel mileage was obtained." EPA requested (Attachment H) the applicant to clarify these statements. The applicant's response (see Attachment J)

> "Depending on carbon deposits in the engine, most vehicles require 2 to 3 tanks of fuel to be consumed to clean out the engine and as this occurs gas mileage increases. Assuming the average car tank capacity provides 250 to 350 miles range, 2 to 3 tanks are approximately 500-1050 miles to show results. Yes, some vehicles show immediate benefits the first day. Benefits are observed after the unit is removed. This is confirmed by test vehicles with and without devices which are switched halfway between the test program and by exhaust emission readings of HC and CO which remained lower after completion of test programs."

indicates that mileage accumulation with the device is required before the device would be expected to have an observable benefit.

(4) Effects on Vehicle Safety:

Based on the patent application description and the installation instructions, the device is judged to be capable of being fabricated to be safe in normal vehicle usage.

(5) Maintenance:

The applicant's statement that no maintenance is required, except for periodic inspection of hose connections, is judged to be correct.

d. Effects on Emissions and Fuel Economy:

(1) Unregulated Emissions:

The applicant submitted no test data and made no claims regarding unregulated emissions. The statements and data supplied in Section 5a relate to regulated emissions and fuel economy only.

However, since the device does not modify the vehicle's emission control system or powertrain and does not appear to change fuel characteristics or regulated emissions, the device should not significantly affect a vehicle's nonregulated emissions.

(2) Regulated Emissions and Fuel Economy:

The applicant submitted three sets of test data from recognized independent laboratories using the FTP/LA-4 and HFET test procedures.* These data are given below:

SCI Laboratories
Test of 78 Ford LTD, April 1982
Hot LA 4, grams/mile

	HC	CO	NOx	MPG	HFET MPG
Baseline LA-4	1.01	1.30	1.09	12.6	17.7
	.67	.19	1.25	12.3	17.9
POLARION-X after 500 miles	.51	2.06	1.15	12.0	17.8
	.50	.89	1.27	12.3	17.7

Fairway Environmental Engineering
Chevrolet Malibu, April 83

Baseline	.28	8.84	.60	17.2
POLARION-X	.30	8.51	.47	17.5

Fairway Environmental Engineering
82 Datsun B-210, April 83

Baseline	.24	7.10	1.06	21.7
POLARION-X	.21	6.46	.92	22.4

Fairway Environmental Engineering
83 Ford Mustang, December 83

Baseline	.21	2.86	.31	14.7	20.6
	.23	2.49	.43	14.7	20.6
POLARION-X	.21	1.31	.40	15.4	21.0
after 1000 miles	.20	2.71	.35	15.5	21.4

* FTP is the Federal Test Procedure, LA-4 is the Urban Driving Schedule. A cold start LA-4 is bags 1 and 2 of this cycle. A hot start is bags 2 and 3 of this cycle. Bag 3 repeats the bag 1 driving schedule, HFET is the Highway Fuel Economy Test.

Fairway Environmental Engineering
83 Oldsmobile Custom Cruiser, December 83
Hot LA 4, grams/mile

	HC	CO	NOx	MPG	HFET MPG
Baseline	.16	1.84	.94	14.1	21.3
	.14	1.87	1.09	14.0	21.3
POLARION-X	.13	.57	.97	14.7	22.8
after 1000 miles	.14	.72	1.04	15.0	22.6

Fairway Environmental Engineering
83 Dodge Van, December 83

Baseline	.15	1.34	1.23	12.3	16.4
	.20	2.02	1.20	12.1	16.4
POLARION-X after	.17	.72	.70	12.7	16.8
1000 miles	.15	.59	.58	12.8	16.8

The analysis of the data indicates that the test results do not show a clear or consistent pattern for the device. The April 1982 test of one vehicle at SCI with Indolene showed no benefit. The April 1983 tests of two vehicles at Fairway with commercial unleaded demonstrated no benefit. The December 1983 tests of three vehicles at Fairway with commercial unleaded indicated that there may be a small benefit. Furthermore, there is insufficient data to separate differences attributable to changes in the various test programs (e.g., mileage accumulation or fuel type) from differences due to the device . Explanations offered for these inconsistencies are unsupported by sufficient data to permit a conclusion. However, it did appear that the data were sufficient to justify EPA proceeding with confirmatory testing, the next step in the evaluation process, if the applicant was willing to bear the test costs (Attachment T).

The applicant concurred, requested EPA to test the device, and provided the test funds (Attachments U, V, and W). EPA tested the device. The detailed report of this testing is given in Attachment W and summarized in Section 7, the following section.

7. EPA Testing of POLARION-X

At the request of the applicant, EPA developed a plan for EPA testing of the device (Attachments U and V). AZ Industries concurred with this plan and funded the test costs (Attachment W).

The test program consisted of mileage accumulation without the device, replicate baseline tests, mileage accumulation with the device, and replicate device tests. The vehicles were tested using the FTP and HFET.* Three vehicles were tested. The test program and results are discussed in detail in the EPA report titled: "Emissions and Fuel Economy of the POLARION-X, A Retrofit Device," EPA-AA-TEB-85-1 (Attachment W).

The results for each vehicle are summarized in Table I below. Emission levels are given in grams/mile while fuel economy is given in miles per gallon. The individual test results for each vehicle are given in the report.

Table I

Summary of EPA Test Results

	FTP				HFET			
	HC	CO	NOx	MPG	HC	CO	NOx	MPG
Plymouth Reliant Baseline	.50	5.90	.98	26.4	.08	.22	.92	35.3
POLARION-X	.63	7.81	.96	26.0	.08	.22	1.02	35.1
Chevrolet Mailbu Baseline	.22	1.59	.76	20.0	.05	.20	.29	29.1
POLARION-X	.22	1.63	1.00	20.0	.05	.18	.66	28.9
Ford Granada Baseline	1.53	10.12	1.52	15.7	.26	.26	1.76	22.0
POLARION-X	1.18	11.24	1.49	15.7	.28	.57	1.65	21.9

*The requirement for test data following these procedures is stated in the policy documents that EPA sends to each potential applicant. EPA requires duplicate test sequences before and after installation of the device on a minimum of two vehicles. A test sequence consists of a cold start FTP plus a HFET or, as a simplified alternative, a hot start LA-4 plus a HFET. Other data which have been collected in accordance with other standardized procedures are acceptable as supplemental data in EPA's preliminary evaluation of a device.

These data show no improvement in emissions or fuel economy for the POLARION-X. As discussed in the report, the differences in the Granada HC emissions was attributed to a stall in the second baseline test.

The overall conclusion from the EPA tests is that there is no reason to expect that the POLARION-X will significantly improve vehicle emissions, fuel economy, or operation. There was no improvement in fuel economy for any vehicle. Changes in emissions were not statistically significant.

As noted in Section 6b(2) EPA is unaware of any information that provides a technical basis to support the claim for improved emissions and fuel economy for an in-line fuel magnet device like POLARION-X. EPA previously tested and evaluated a similar product known as Super-Mag Fuel Extender (EPA-AA-TEB-511-82-3) and provided a copy of the Super-Mag report to the applicant (Attachment M). The Super-Mag also showed no emissions or fuel economy benefit.

Conclusions

EPA fully considered all of the information submitted by the applicant. This second evaluation of the POLARION-X device was based on that information and the results of the EPA confirmatory test program of the device.

The information supplied by the applicant was insufficient to adequately substantiate either the emissions or fuel economy benefits claimed for the device. In the EPA tests there was no improvement in fuel economy for any vehicle. Changes in emissions were not statistically significant. Vehicle operation and performance were unchanged by the device. The overall conclusion from these tests is that the POLARION-X did not significantly improve vehicle emissions, fuel economy, or operation.

EPA is unaware of any technical analysis or data that demonstrates that magnetically treating a hydrocarbon fuel will beneficially affect the emissions or fuel economy of a vehicle. The previous EPA testing of Super-Mag, a similar device, showed no emissions or fuel economy benefits. Therefore, based on this information, our engineering judgment, and the test results it is concluded that the POLARION-X device will not improve emissions or fuel economy.

At the conclusion of the testing and evaluation process copies of the test report and 511 evaluation report were sent to the applicant for review. The applicant raised objections related to the EPA analysis of the Polarian-X theory of operation and

the applicant funded road and laboratory tests. Since, the EPA results differed from these results, he felt that another independent 511 test program was warranted. EPA reviewed these concerns but considered further testing unwarranted and therefore published the results unchanged. The applicant's letter, Attachment W, and EPA's reply, Attachment X, were added to the 511 evaluation report.

FOR FURTHER INFORMATION CONTACT: Merrill W. Korth, Emission Control Technology Division, Office of Mobile Sources, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105, 313-668-4299.

List of Attachments*

Attachment A — Patent Application (provided as an attachment to November 30, 1981 letter to EPA). The device is now patented, Pat. No. 4,372,852 dated 2/8/83.

Attachment A-1 — Block Diagram of Magnetic Unit (provided with 511 application).

Attachment B — "Abstract of Development of POLARION-X", dated July 1, 1981 (provided with 511 application).

Attachment C — Background Data on Magnetic Fuel Treatment (provided with 511 application).

Attachment D — POLARION-X GAS SAVER UNIT SPECIFICATIONS by Albert J. Kovacs, the inventor of the device.

Attachment E — POLARION-X installation brochure and warranty, the pamphlet also contains history and principles of operation (provided with 511 application).

Attachment F — Letter of September 3, 1981 from Ed Payne, Transportation Testing of Texas, to Al Kovacs, a consultant of AZ Industries (provided with 511 application).

Attachment G — Letter of September 23, 1981 from Ed Payne, Transportation Testing of Texas to Dale Diver of AZ Industries (provided with 511 application).

Attachment H — Letter of October 26, 1981 from EPA to LaVern Adam of AZ Industries acknowledging receipt of 511 application for the POLARION-X and requesting clarification and additional information.

Attachment I — Letter of October 27, 1981 from EPA to LaVern Adam of AZ Industries describing procedures for testing at an independent laboratory by the applicant.

* Attachments A through S were incorporated in the previous evaluation of the device and, to conserve space, are only listed here.

Attachment J — Letter of November 30, 1981 from LaVern Adam of AZ Industries to EPA in response to EPA request for clarification and additional information about the device.

Attachment K — Letter of December 11, 1981 from LaVern Adam of AZ Industries to EPA requesting EPA to comment on two quotations and to assist in developing a test plan.

Attachment L — Letter of December 14, 1981 from EPA to LaVern Adam of AZ Industries requesting clarification and information for items not fully covered by prior response (Attachment J).

Attachment M — Letter of December 18, 1981 from EPA to LaVern Adam of AZ Industries responding to request to comment on proposal testing.

Attachment N — Letter of January 15, 1982 from LaVern Adam of AZ Industries to EPA responding to EPA request (Attachment L) for information and clarification.

Attachment O — Letter of January 21, 1982 from EPA to LaVern Adam of AZ Industries reiterating EPA's request for information.

Attachment P — Letter of March 9, 1982 from EPA to LaVern Adam of AZ Industries notifying applicant that EPA would shortly close out the evaluation if adequate test data wasn't provided.

Attachment Q — Letter of March 24, 1982 from Dale V. Diver of AZ Industries to EPA which provided a copy of the POLARION-X test plan.

Attachment R — Letter of March 25, 1982 from Albert J. Kovacs, a consultant of AZ Industries, to EPA providing information and data on POLARION-X.

Attachment S — Letter of April 5, 1982 from EPA to LaVern Adam of AZ Industries commenting on the test plan for POLARION-X.

Attachment T — Letter of February 6, 1984 from EPA to Mr. LaVern Adam, President of AZ Industries acknowledging receipt of the new 511 application for the POLARION-X and asking if AZ is willing to fund the EPA confirmatory testing.

Attachment U — Letter of February 23, 1984 from Mr. Adam of AZ Industries that indicated AZ wished to proceed and would pay the test costs.

Attachment V — Letter of March 13, 1984 from EPA to AZ Industries which discussed the testing, provided a test plan test agreement, a test plan for concurrence, and request for test funds. A copy of the attachments to this letter is provided on the test report below.

Attachment W — Letter of July 30, 1985 from Thomas S. Huntington, an AZ Industries Attorney, in which he took exception to several items in the 511 report.

Attachment X — Letter of August 22, 1985 from EPA to Thomas S. Huntington, and AZ Industries responding to preceding letter.

Attachment Y — EPA Test Report, "Emissions and Fuel Economy Effects of the POLARION-X, a Retrofit Device," EPA-AA-TEB-85-1.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

OFFICE OF
AIR, NOISE AND RADIATION

February 6, 1984

Mr. LaVern Adam, President
AZ Industries, Inc.
28065 Diaz Road
Temecula, CA 92390

Dear Mr. Adam:

We received your letter of December 19, in which you applied for a second evaluation of the POLARION-X as a fuel economy retrofit device.

Our engineering evaluation group has made a preliminary review of your application and has identified several items which we wish to clarify. Our comments below address these items and our understanding or position on each of them.

1. Your accompanying letter (Speedimemo) stated that this was a resubmittal of the original application. However, since we conducted and completed an evaluation of the device in response to your previous application, we consider this to be a new application. Therefore, our previously completed evaluation must be considered our official and only evaluation until this evaluation process is completed.

2. Your application implied that this was a photostatic copy of the original application, with subsequent test data incorporated. We also noted a few minor changes (e.g., patent now issued rather than pending, a few changes in principals) but do not consider these to have materially altered the original application.

3. Since this application is essentially unchanged from the previously completed evaluation of the device, we consider the previous corresponding responses and analyses that were incorporated in the evaluation of the original application to also apply to this application.

4. There were numerous letters and phone calls concerning the device and the test fuel that were not incorporated in your original application since they occurred after the evaluation was written. These are considered to apply to this application. A summary of the pertinent letters is enclosed.

5. Although the type of test fuel used and/or its effect on the device were not addressed in either this or your original application, your previous concern about the proper test fuel is considered to be incorporated in this application.

6. As we have previously stated, we consider all pertinent data in the evaluation of a device. Therefore, we consider the test results from all six-vehicles, rather than just the last three, to apply to this application.

7. Thus, since it appears we do not require further information, we consider your application to be complete and are now processing it.

In our prior evaluation of the device we concluded that neither the information supplied nor our own literature search provided a reasonable theoretical or technical basis to support the conclusion that the device might improve fuel economy or emissions. This application provided no new technical information to alter this conclusion.

The analysis of the data indicates that the key item, the test results from recognized independent laboratories using the proper test procedures, do not show a clear or consistent pattern for the device. The April 1982 test of one vehicle at SCI with Indolene showed no benefit. The April 1983 tests of two vehicles at Fairway with commercial unleaded demonstrated no benefit. The December 1983 tests of three vehicles at Fairway with commercial unleaded indicated that there may be a small benefit. Furthermore, there is insufficient data to separate differences attributable to changes in the various test programs (e.g., mileage accumulation or fuel type) from differences due to the device. Explanations offered for these inconsistencies are unsupported by sufficient data to permit a conclusion. However, it appears that the data is sufficient to justify EPA proceeding with confirmatory testing, the next step in the evaluation process.

As you are aware, EPA is now required to charge for this testing. Based on the available information for your device, we anticipate that we will need to test up to five vehicles (replicate tests with and without your device). To reduce costs we would test only with commercial unleaded, thus the fuel question would not be resolved. Also, the vehicles would be tested with at least 1,000 miles rather than at different mileage intervals. Again this would not resolve the mileage issue but would remove it as a test variable. To further minimize test cost we will try to supply most of the test vehicles; however the required testing will still cost up to $18,000.

Thus, at this time, we consider your application complete but we cannot now proceed with our evaluation without positive action on your part to fund the necessary confirmatory testing. Please let me know by March 1, if you desire to proceed and will pay the required costs. We

will then develop a test plan for your concurrence and arrange for the transfer of the funds. If you are unwilling to fund the required confirmatory testing, we must close out the evaluation with essentially the same conclusions as before, that is, that there are insufficient data or theoretical explanation to conclude that the device improves fuel economy.

Please call me if you have any questions, or I can be of further assistance.

Sincerely,

Merrill W. Korth

Merrill W. Korth
Device Evaluation Coordinator
Test and Evaluation Branch

Enclosure

cc: Ted Schoenberg

POLARION-X
Supplemental Correspondence

Attachment 1	Letter of September 1, 1982 from Michael A. Keefe of Little Buddy Products Company (a consultant to AZ Products and marketer of the POLARION-X) providing test results for the device and commenting on the test fuel.
Attachment 2	Letter of September 20, 1982 from EPA to Michael Keefe of Little Buddy Products Company responding to preceding letter.
Attachment 3	Letter of October 15, 1982 from Michael Keefe of AZ Industries requesting that the evaluation of the POLARION-X be halted.
Attachment 4	Letter of November 15, 1982 from EPA to Michael Keefe of AZ Industries informing him that evaluation would have to proceed.
Attachment 5	Letter of March 10, 1983 from EPA to AZ Industries informing them that device applicants would be charged for the EPA evaluation testing of devices.
Attachment 6	Letter of March 15, 1983 from AZ Industries acknowledging receipt of preceding letter.
Attachment 7	Letter of May 4, 1983 from Les Adam of AZ Industries which stated that the POLARION-X had been recently tested by Fairway Environmental Engineering (at the request and expense of AZ Industries). This data was to be submitted to CARB to support an exemption request. Note, no data was provided with this letter.
Attachment 8	Letter of May 16, 1983 from EPA to Ted Schoenberg, a consultant of AZ Industries, providing him a package of information regarding device evaluations.
Attachment 9	Letter of May 24, 1983 from Ted W. Carlson of Fairway Environmental Engineering to EPA discussing screening test of vehicle for a POLARION-X test program.
Attachment 10	Letter of May 25, 1983 from Les Adam of AZ Industries to EPA that forwarded preceding test plan letter to EPA and requested comment.
Attachment 11	Letter of May 27, 1983 from EPA to Les Adam of AZ Industries commenting on preceding test plan.

Attachment 12 — Mailgram of October 5, 1983 from Fairway Environmental Engineering to EPA discussing screening test of vehicle for a POLARION-X test program.

Attachment 13 — Letter of October 11, 1983 from EPA to Richard Carlson of Fairway Environmental Engineering commenting on test program and vehicle test results.

Attachment 14 — Test report of December 8, 1983 summarizing POLARION-X test results for the three test vehicles.

Attachment 15 — Letter of December 13, 1983 from Richard Carlson of Fairway Environmental Engineering to EPA forwarding preceding test results.

Attachment 16 — Letter of December 19, 1983 from Les Adam of AZ Industries to EPA submitting an application for a 511 evaluation of the POLARION-X device. Accompanying Speedimemo of the same date noted that this application was a photostatistically reproduced copy of the original application of October 14, 1981.

Attachment 17 — Letter of January 3, 1984 from Les Adam of AZ Industries to EPA that provided a copy of their test data booklet on the POLARION-X.

ATTACHMENT U

AZ INDUSTRIES™
INCORPORATED
28065 DIAZ ROAD, TEMECULA, CALIFORNIA 92390 • TELEPHONE (714) 676-6331

February 23, 1984

Mr. Merrill Korth
Device Evaluation Coordinator
Test and Evaluation Branch
United States Environmental Protection Agcy.
Ann Arbor, Michigan 48105

Dear Mr. Korth:

We are in receipt of your letter dated February 6, 1984 . We would like to proceed with the testing of the Polarion-X and will pay the required costs of the tests up to the stated amount of $18,000. We then await your test plan for the Polarion-X.

Respectfully,

Les Adam

Les Adam
President

ATTACHMENT V

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

March 13, 1984

OFFICE OF
AIR, NOISE AND RADIATION

Mr. LaVern Adam, President
AZ Industries, Inc.
28065 Diaz Road
Temecula, CA 92390

Dear Mr. Adam:

We received your letter of February 23, indicating your willingness to proceed with the Section 511 evaluation of POLARION-X by funding the EPA confirmatory testing.

We have developed a test plan which we believe will appropriately evaluate the effectiveness of your device. All mileage accumulation will be conducted using established road routes. All testing will be conducted at our laboratory in Ann Arbor and you will be charged for all mileage accumulation and testing. The test plan has been prepared and is transmitted for your concurrence. Upon receipt of your written concurrence and the funds to cover test costs, we will begin the actual testing as soon as feasible.

You will be welcome to observe all phases of the testing and we will provide you with a complete set of results once our evaluation is completed. The testing should require a total of six to eight weeks to complete. Another two to four weeks should be allowed for us to evaluate the results and to prepare a technical report. Although EPA does not "approve" devices under Section 511, you will receive an official notification of our findings and a synopsis of the test results will be published in the Federal Register.

Representative passenger cars will be tested first in a baseline configuration (set to vehicle manufacturer's tune-up specifications) and second, after the POLARION-X has been installed. Both test sets will be preceded by 1000 miles of mileage accumulation on the road. EPA presently intends to test the device in two phases. In the first phase, three vehicles will be used. Then, if additional testing is required to confirm the results, two additional vehicles will be tested.

The tests to be performed are the Federal Test Procedure and the Highway Fuel Economy Test. These tests are the ones which result in the published values for city and highway fuel economies. Each of these tests will be performed at least two times at each test point to increase the confidence in the results. You should find the remainder of our test procedure to be described in sufficient detail in the enclosed test plan.

If you believe either the mileage accumulation distance or procedure will not adequately prepare the vehicles for the testing, please inform EPA immediately and provide documentation to justify alternative recommendations.

If you concur that the results of testing conducted in accordance with this test plan will accurately reflect the effectiveness of your device, please sign the agreement portion and return the document with the funds to cover the test costs to EPA by March 31, 1984. The signed test plan should be returned to EPA, Ann Arbor. The funds in the amount of $18,000 for the test program should be sent to:

Mr. Richard Ruhe
U.S. Environmental Protection Agency
Accounting Operations Office
Cincinnati, OH 45268

and made payable to:

U.S. Environmental Protection Agency

We have established an account there to process these funds. Any excess will be returned to you.

We will provide you the specifications of the commercial unleaded fuel to be used for this program. You will be notified of the testing schedule as soon as possible. You should also be aware that the EPA reserves the right to conduct any additional testing which may be necessary to resolve questions arising from the basic test program. This is required by the regulations under 40 CFR 610.

Please let me know by March 31, 1984 whether or not you concur with the Test Plan and Test Agreement.

Edward Barth is the project engineer who will perform the EPA evaluation of POLARION-X. However, I will remain your official point of contact within EPA. If you have any questions or require further information before returning the agreement forms, please contact me at (313) 668-4299.

Sincerely,

Merrill W. Korth

Merrill W. Korth
Device Evaluation Coordinator
Test and Evaluation Branch

Enclosure

cc: Pat Brower
Ted Schoenberg

ATTACHMENT W

LAW OFFICES
PETER M. ROSEN & ASSOCIATES
29373 RANCHO CALIFORNIA ROAD
P.O. BOX 1819
TEMECULA, CALIFORNIA 92390

PETER M. ROSEN
JEFFREY C. STEARNS
JOYCE E. FLEMING
THOMAS S. HUNTINGTON
—
OF COUNSEL
RICHARD A. MUENCH

TELEPHONE
(714) 676-2339

July 30, 1985

Merrill W. Korth
Device Evaluation Coordinator
U. S. Environmental Protection Agency
Ann Arbor, Michigan 48105

RE: A-Z Industries, Inc.
POLARIAN-X

Dear Mr. Korth:

I am writing on behalf of A-Z Industries, Inc to express and put on record their comments and protests of your evaluation of the Polarian-X as contained in the EPA Draft report by Edward Barth, dated April 1985.

Theory of Operation

The first comment in the report that A-Z takes issue with is the statement on page 8:

> "The applicant did not provide a sound technical basis to believe the POLARIAN-X has a beneficial effect on the emissions or fuel economy. EPA is not aware of any information that demonstrates that magnetically treating the fuel will affect emissions or fuel economy. The applicant was unable to provide a technically sound theoretical explanation that adequately described the beneficial effects of the device."

Despite numerous attempts by A-Z to provide scientific and technical explanations for the operation of the Polarian-X the EPA apparently refused to give credence to any of the theories advanced. A-Z candidly admitted that the scientific reasons for the operation of the POLARIAN-X may be difficult to explain and that its operation is based upon theories. It appears that the EPA focused on that statement rather than giving credence to the theories advanced.

One of the theories for explaining the operation of magnets on hydrocarbon fuels, advanced by A-Z, was that propounded by J.D. Van Der Waals, Phd in physics, as follows:

> "Electrons orbiting around the nuclei of atoms have di-poles which are in a neutral state.

However, these di-poles may be affected by magnetic and electric forces which appear to cause deflection. A simple form of hydrocarbon fuel is pentane C_5H_{12}. Hydrogen has a cage-like structure and has a tendency to interlock with other elements, not forming other compounds, but temporarily forming 'pseudo compounds.' When these 'pseudo compounds' are influenced by electric and magnetic fields there is pronounced interlocking with oxygen causing better combustion."

I believe A-Z supplied you with the basics of this theory, as well as other theories propounded by other scientists. Some other literature, which I believe was supplied, included studies on the subject of the magnetic treatment of water for removing impurities. That literature also included descriptions of devices used in purifying water similar in operation to the Polarian-X and included detailed discussions of the theories upon which those devices are believed to work. See for example the article written by James F. Grutsch, Director of Environmental Technology Standard Oil of Indiana and J. Warren McClintock, Engineer Environmental Control, AMOCO Oil Company entitled "Corrosion and Deposit Control in Alkaline Cooling Waters Using Magnetic Water Treatments at AMOCO's Largest Refinery." I am enclosing another copy.

There is a suspicion on the part of A-Z that you and the EPA have a preconceived bias against such magnetic devices based solely on the fact that the precise explanations for how such devices work are based upon scientific theories rather than any clearly visible mechanical operation. Again on page 15 of the EPA report, in evaluating the test results, the report says "EPA is unaware of any information that provides a technical basis to support the claim for improved emissions and fuel economy for an in-line fuel magnet device like POLARIAN-X".

Inconsistent Prior Test Results

The report notes that the test results on the device prior to this last EPA test are not consistent. This is quite apparent and is explained by the fact that the various test were all different. For example, there was no mileage accumulation test on the tests conducted for the California Air Resources Board, and indolene was used on the SCI laboratory tests and dynometers were used rather than actual mileage.

Overall Results of All Tests

Nevertheless, the EPA report fails to discuss all of the prior test, most notably the testing done at Transportation Testing, Inc in Texas, which showed fuel improvement increases of from 5.18% to 18.10%. The report does take note that a total of 33 cars have had the units installed for testing purposes, but the report fails to mention that out of those 33 cars tested 29 cars showed various degrees of positive results.

Inconsistent EPA 511 Tests

Even granting that all those prior test result may be inapplicable for EPA purposes, that should not be true for the EPA 511 testing done by Fairway Environmental Engineering in 1983. This was a test approved by you and according to the information I have, Fairway Environmental is one of several independent testing companies authorized by the EPA to conduct EPA Section 511 tests. It is also my understanding that the tests conducted by Fairway are the same as the tests conducted by you.

Yet Fairway's test results for its EPA 511 test for three cars (Fairway Environmental Test Reprt dated December 8, 1983) showed positive mileage gains with the POLARIAN-X of +5.4%,+ 5.8% and +4.7% on the city driving test (LA- 4 test) and of +2.9%, +6.7% and +4.0%E on the Highway Fuel Economy tests (HFET), whereas your test shows no positive results for either the LA-4 test or HFET test on any of the three vehicles tested by you. Similarly Fairway's tests showed decreases in all categories of emissions and decreases of from -1.0 to -65.1 for both tests except for a small increase in hydrocarbons on the highway test for one car (+6.3) and an even smaller increase in NOx emissions on the city driving test for the same car (+2.7). All the other emissions tests for the Fairway Test showed decreased emissions with the Polarion-X. The average percentage decreases in emissions for all three cars were from 3.8% to 46.4%. EPA's test on the other hand showed either very slight increases in emissions or very slight decreases.

Request For a Third Independent EPA-511 Test

Why the inconsistency? Is there something wrong with Fairway's testing procedures? Again, even if we discount all the positive results shown from all the non-EPA 511 tests, is it fair to apparently totally disregard the positive result achieved by Fairway's 511 test?

We have had discussions with Fairway, and it is their opinion that the differences in the results of their test and yours are quite significant. They are at a loss to explain the divergence. They attest to the correctness of their testing procedure and claim that their equipment is correlated with yours. In discussions with Ted Carlson at Fairway he said that he and his engineers took special interest in testing of the Polarian-X because they also were skeptical of the device. Because of their skepticism he aid that they did additional testing which is not on their EPA 511 report. They ran 15 different tests, and that on every test there was at least some favorable results.

A-Z Industries has put a lot of time and money into the testing of the Polarian-X, and they believe in their product. Under the circumstances it seems only fair and equitable that the inconsistency between the two EPA 511 tests be able to be decided by a third EPA 511 test by a different independent laboratory

approved and certified by the EPA as qualified to do a 511 test. A-Z would, of course, have to bear the additional expense, but they would be willing to abide by the result if the EPA would also agree to abide by the results of such a third independent--a tie breaker, as it were--and that the EPA would include such results in any published EPA reports on the Polarian-X.

Even if there is no administrative procedure for requiring such agreement to additional testing on the part of EPA, please consider this a formal request for such action. Even if there is no such formal procedure or even precedent, for such action, there should be the flexibility to find a way to accomplish it, and again A-Z will fund it and will abide by it unequivocally.

Please seriously consider this request and if there is anything I can do or anyone I can contact to help bring it about, please let me know.

Sincerely,

Thos Huntington

THOMAS S. HUNTINGTON

TSH:mjr

APPROVED: A-Z INDUSTRIES, INC.

By: _____
LES ADAM, President